

Title Influence of fumigation with high concentrations of ozone gas on postharvest gray mold and fungicide residues on table grapes

Author Franka Mlikota Gabler, Joseph L. Smilanick, Monir F. Mansour and Hakan Karaca

Citation Postharvest Biology and Technology, Volume 55, Issue 2, February 2010, Pages 85-90

Keywords Fumigation; Postharvest gray mold; Ozone; Fungicide residues

Abstract

To control postharvest decay, table grapes are commercially fumigated with sulfur dioxide. We evaluated ozone (O₃) fumigation with up to 10,000 μL L⁻¹ of ozone for up to 2 h to control postharvest gray mold of table grapes caused by *Botrytis cinerea*. Fumigation for 1 h with 2500 or 5000 μL L⁻¹ of ozone were equal in effectiveness. Both treatments reduced postharvest gray mold among inoculated ‘Thompson Seedless’ grapes by approximately 50% when the grapes were examined after storage for 7 d at 15 °C following fumigation. In a similar experiment, ‘Redglobe’ grapes were stored for 28 d at 0.5 °C following fumigation for 1 h with 2500 or 5000 μL L⁻¹ of ozone. Both treatments were equal in effectiveness, but inferior to fumigation with 10,000 μL L⁻¹. Ozone was effective when grapes were inoculated and incubated at 15 °C up to 24 h before fumigation. The cluster rachis sustained minor injuries in some tests, but berries were never harmed. Ozone was applied in three combinations of time and ozone concentration (10,000 μL L⁻¹ for 30 min, 5000 μL L⁻¹ for 1 h, and 2500 μL L⁻¹ for 2 h) where each had a constant concentration × time product ($c \times t$) of 5000 μL L⁻¹ × h. The effectiveness of each combination was similar. The incidence of gray mold was reduced by approximately 50% among naturally inoculated, organically grown ‘Autumn Seedless’ and ‘Black Seedless’ table grapes, and by 65% among ‘Redglobe’ table grapes, when they were fumigated with 5000 μL L⁻¹ ozone for 60 min in a commercial ozone chamber and stored for 6 weeks at 0.5 °C. Residues of fenhexamid, cyprodinil, pyrimethanil, and pyraclostrobin were reduced by 68.5, 75.4, 83.7, and 100.0%, respectively, after a single fumigation of table grapes with 10,000 μL L⁻¹ ozone for 1 h. Residues of iprodione and boscalid were not significantly reduced. Ozone is unlikely to replace sulfur dioxide treatments in conventional grape production unless its efficacy is improved, but it could be an acceptable technology to use with grapes marketed under “organic” classification, where the use of SO₂ is prohibited, or if SO₂ use were to be discontinued.